TANZANIA FISHERIES RESEARCH INSTITUTE

Fish Diversity of the Wild and Aquaculture water bodies - in Singida Region.

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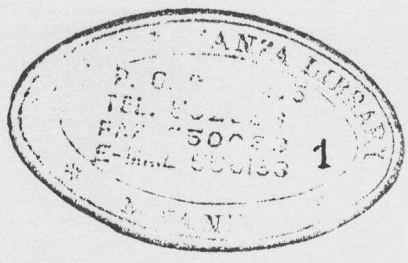
1. INTRODUCTION.

Tanzania boasts to have the largest number of fish (freshwater and marine) species in Africa. The number of fish species may be surpassed by those of the Democratic Republic of Congo (DRC) when those of the latter are finally described. Since Tanzania borders the Great Lakes of Africa (Lakes Victoria, Tanganyika and Nyasa), the country is rich in Cichlid fauna, estimated to exceed 700 (Eccles, 1992). The works of Eccles (1992) and Bianchi have contributed substantially to the species diversity (fresh water and marine) in Tanzania. However, these works do not give exactly the extent of the distribution of such species in the country.

Tanzania Fisheries Research Institute being currently the only fisheries research institute in Tanzania has sole responsibility of marking the presence and distribution of fish species in the country. This work is expected to be completed by the year 2005. In order that this work can be accomplished, both published works and field observations (including geographical location using GPS) have to be compiled. Since the institute has centers in all the Great Lakes and one along the Indian Ocean coast, it is expected that field observations and identifications will be obtained and incorporated into the document to be produced by 2005. One major obstacle is the acquisition of data and information on the inland small water bodies which are also very rich in fish biodiversity. In trying to bridge this gap the Director of Fisheries and the Director General of TAFIRI made special field tours of the inland region particularly Singida (July, 2002), Dodoma (July, 2002) and Tabora (September/October, 2002). During these trips/tours they were also expected to look at the extent of aquaculture developments in these regions.



The present report gives the findings of the tour of Singida Region. The region is fairly large with most of the Southern part (Manyoni District) covered by Miombo woodlands (Fig. 1). Due to its central position, the region does not have external drainage. All the waters either end in swamps which are filled during the rainy season and dry up during the dry season or spill over to the neighbouring districts of Dodoma and Arusha Regions. The main water bodies, therefore, have saline waters as a result of internal drainage. To the south, the drainage ends in the Bahi Swamps. During the Elnino rains of 1997/98, this swamp became filled with water to form a lake. .

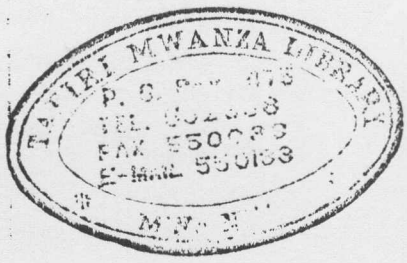
Aquaculture in Singida has not developed much despite reports by the region that there were 155 fish ponds (Budget Speech 2002/2003 Ministry of Natural Resources and Tourism). This is 1.31% of the total country figure of 11,786 ponds and ranks 10th in the country. The purpose of the trip was among other things:-

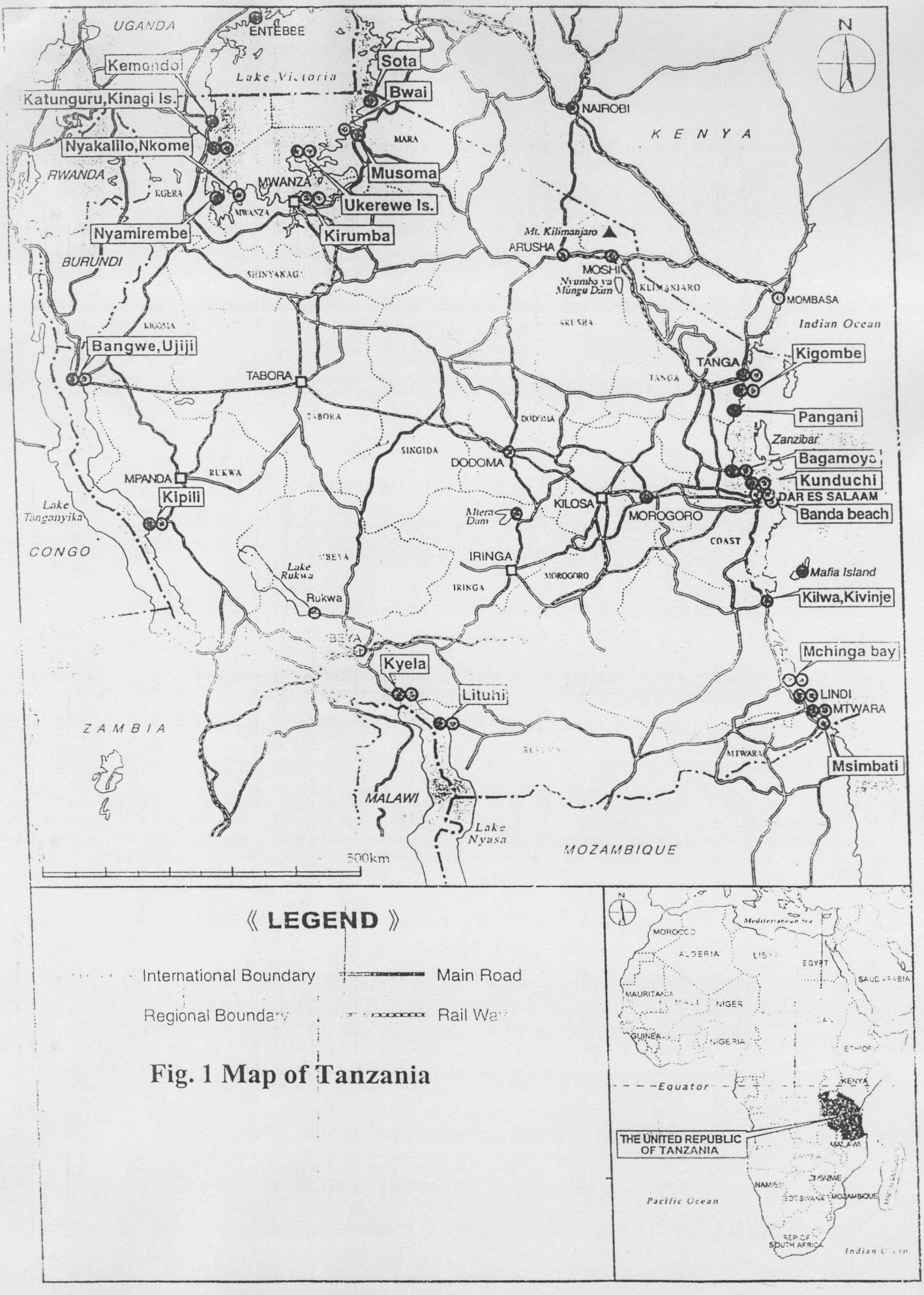
(a) To meet different administrators in the region with the aim of discussing how to improve fisheries and improve aquaculture development in the region.

(b) To visit fishing and landing sites of the natural and man made water bodies so as to learn on the species captured,

(c) To visit aquaculture sites and advise on how to improve and,

(d) To advise the stakeholders on how to develop sustainable fishery in the region.





《 LEGEND 》

International Boundary

Regional Boundary

Main Road

Rail Way

Fig. 1 Map of Tanzania

2. MATERIALS AND METHODS.

The survey was conducted by the team from Dar es Salaam and District Fisheries/Natural Resources Officers of the respective districts. Fish farmers were interviewed so as to get their views on fish farming. This included, the type of fish stocked, the date of stocking, whether or not the farmer has harvested any fish from the farm, what food the fish are fed on and how frequent, what were their major drawbacks in aquaculture development. Fishermen were also interviewed on their fishing experiences and problems. Whenever possible the fish species were identified in the field using keys from Trewavas (1983), and Eccles (1992). Any doubtful identification was confirmed by additional records from the institute's collections. In most cases the fishermen were willing to have their fish identified and examined. The fish were measured (length), their body cavities opened to expose the gonads (males and females): The sexes were identified and maturity stages recorded as mature, maturing or immature.

In some places, e.g. in Lake Makuro, a beach seine was set and hauled to sample the fish. This enabled the team assess the size composition of the fishes together with species distribution in the sampled areas.

3. RESULTS

The results of this survey are summarized in Tables 2 and 3. From these tables it is shown that a total of 11 (eleven) species of fish were encountered in the natural and man made dams in Singida region. Lake Kitangiri had the highest diversity (with a total of 5 species or 45.5%) followed by Bahi swamp and Migori Dam, each with 4 (four) species. Of the fishes occurrence, *O. niloticus* occurred in 10 out of the 14 habitats (71.4%) surveyed. These are followed by *Oreochromis esculentus* and *Clarias gariepinus*.

Although the National figures for aquaculture show that Singida Region had 155 ponds (see Table 1), during this survey, little aquaculture was observed. The cultured fish in Singida included *Oreochromis niloticus* and *Tilapia* sp. The culture of *O. niloticus* was popularized by the efforts of Magereza (of Singida) in culturing these fish.

Table 1: The number of Fish ponds in Tanzania During the year 2002/2003 Budget Session.

Region	No. of Ponds	Percentage Composition	Position
Ruvuma	3,441	29.19	1
Iringa	2,522	21.39	2
Kilimanjaro	1,660	14.08	3
Mbeya	1,170	9.92	4
Arusha	733	6.21	5
Tanga	534	4.53	6
Lindi	381	3.23	7
Morogoro	335	2.84	8
Mtwara	232	1.96	9
Singida	155	1.31	10
Tabora	115	0.97	11
Mara	105	0.89	12
Pwani	96	0.81	13
Kagera	91	0.77	14
Mwanza	51	0.43	15
Kigoma	50	0.42	16
Shinyanga	37	0.31	17
Dar es Salaam	34	0.28	18
Dodoma	28	0.23	19
Rukwa	16	0.13	20
Total	11,786		

Table 2: Summary Report of the Scientific findings of the Fisheries Expedition in Singida Region – July, 2002.

District	Name of Pond or Place	Description of Area	Fish species cultured or sampled	Previous Records	Advise, Comments or Remarks
Dodoma/Manyoni	Bahi Lake	One camp visited, namely Chimendeli Camp. Activities included fish smoking, frying salting and sun drying, and selling mechandise. The lake was previously a swamp which filled up with water during the Elnino Rains of 1997/98, now permanent, bottom is muddy. The swamp dried completely in 1992 and refilled in 1998.	*Oreochromis esculentus, O. niloticus. O. amphimels, Clarias gariepinus*	*C. gariepinus* was the common fish. The tilapias may have come by rain via Babati and Kondoa.	Most fish small though mature. Advised to regulate fishing by using legal mesh sizes of not less than 3 inches. *Clarias gariepinus* infested with round worms. This species (*C. gariepinus*) feeds heavily on *O. esculentus.* Reduce fishing pressure (at the time of visiting there were 250 dug-out canoes and 320 fishermen). Reduce water uptake in the rice pans in the catchment as this accelerates the drying of the lake due to insufficient water.
Singida	Lake Singida	This is a natural lake situated on the Northern side of the town. The lake is chocked with aquatic weed, which forms	*Oreochromis niloticus* and *Haplochromis* spp (fish eating species) males of *O. niloticus* seen to mature at	Previous works to be consulted.	There is no active fishing due to the submerged weed which impedes fishing. More research should be carried out to

		heavy mat on the surface of the water thus impeding fishing. Tall grass Typha also seen at some edges.	16.6cm TL		identify the fish species in the lake since there is a possibility of finding endemic species there.
"	Lake Kindai	This is a natural lake formed out of internal drainage, hence it is salty (soda lake). The lake is shallow, fringed by Typha grass at edges and several metres at places. Lake with muddy bottom.	*Oreochromis niloticus.*	The fish species came from Magereza ponds which overflooded during the El-Nino rains of 1998. Also some came from the local farms which also got flooded during the El-Nino rains.	The use of African Fan Palm (*Borassus ethiopium*) is common, the palm is known to be breeding substrate for some species of birds (herons). It should therefore be discouraged. Mesh size restriction imposed on the lake (2½") should continue as it restores the species.
"	Lake Murya	This is a natural lake formed by internal drainage. During drought the lake dried up as the case was in the 1970's. During the El-Nino rains of 1998 the lake level rose covering up to 50 metres from original shoreline. When the	*Tilapia zilii, Oreochromis esculelentus, Barbus paludinosus*	A mixture of tilapias and other fishes were introduced into the lake from Lake Basuto in Hanang District in 1998.	On safety during fishing, fishers were advised to learn how to swim. Recommended to use gillnets of 2½ – 3 inches to catch the fish. Introduction of *Labeo* sp. not advised since there is not any suitable breeding grounds for this fish in the lake and besides the lake is soda

		lake dries, people mine some soda salt (magadi); substratum sandy.			lake. .
"	Lake Misoghereda	This is a natural lake. It is separated from lake Murya by a strip of land less than 1 km wide; substratum sandy mud.	*O. esculentus, C. gariepinus*	*O. esculentus* was introduced into this lake	Beach seine should be prohibited. Use of 2½ – 3 inches gillnets encouraged.
"	Lake Makuro	This is a natural lake. The lake is fringed with Typha grass which is advancing towards the middle. The substratum is sandy-mud. Water fertile – good for *O. niloticus.*	*O. niloticus.*	*O. niloticus* were introduced by TCRS project in 1999 from Magereza ponds in Singida.	The fish were growing well. Advised to restrict entry to the fishery (retain the present 10 dug-outs and 30 fishers). Encourage use of 3 inches gillnets. Encourage survival of the present fishers.
"	Mabwawa ya Kijiji cha Kijota	Three ponds were visited, one belonging to Mrs. Rita Sima was well managed.	*O. niloticus*	*O. niloticus* were introduced from Lake Makaro	Encourage fish farming.
"	Mgori Dam	This is a man-made dam; construction started in 1948 and was completed in 1952. The dam was	*Oreochromis hunteri, Barbus paludinosus, Astatotilapia bloyeti, Tilapia rendalli*; most	-	Over fishing was reported especially use of 2" gillnets. Advised to restrict fishing to 2½ - 3" gillnets, investigate

		to provide water for irrigation and animal consumption; observed high population of bivalves and gastropods.	fishes were stunted.		the claim of the presence of egg eating haplochromines (TAFIRI). Advised to redirect the river course (second river) so as to increase water into the dam.
"	Sugana village ponds (several)	Several ponds owned by individuals. Use spring water	Stocked by *O. niloticus* from Magereza and *O. hunteri* from Mgori.	-	Encourage fish farming.
"	Mianji Dam	This is a man made dam which was constructed in 1952, by blocking a river to provide water for irrigation in the nearby and Makyungu village. The dam was used as a recreational place during colonial time but has since been abandoned. The edges of the dam are fringed with Typha grass.	Reported *Tilapia* and *Clarias*	-	Rehabilitate the infrastructure and the dam wall. Also utilize the fishery resources in the dam.
"	Kinku	14 ponds owned by individual farmers. The ponds get their	Fish stocked include *Clarias gariepinus*, *Tilapia* sp.	-	Since the farmers have shown interest in integrated fish farming,

		water supply from springs.			they should be encouraged to develop this; particularly, Mr. Bruno Mateo who has a tree nursery along side the ponds. Train farmers to stock good seed fish.
Iramba District	Lake Kitangiri	The lake is joined by a river (River Sibiti) to Lake Eyasi. Also the lake drains the Wembere swamp. The lake is shallow.	*Oreochromis niloticus*, *O. esculentus*, *O. amphimelas*, *Protopterus aethiopicus* and *Clarias gariepinus*.	Kitangiri was once one of the most important inland fisheries in the country. In fact Fisheries Department had built an office and quarters for workers to record fish catches. The fishes are growing well.	It is strongly recommended to carry out a scientific survey in the lake to ascertain species diversity and productivity of the lake. The use of dug outs made from the African Fan Palm *Borassus ethiopium* should be discouraged. The place would be developed for tourism industry. Improve the road between Kiomboi and Kitangiri. Gill nets should not be less than 3½ inches.
"	River Sibiti	Attempts to reach the river course were not successful because of lack of proper map and	*O. esculentus*. These were observed being sun dried, and packed for sale. The fish were however	No records available.	More work to be done to identify the fishes in this river.

		guide.	smaller than those at Kitangiri.		
"	Ulughu Dam	This is a man made dam constructed in the 1950's for the purpose of providing water for domestic animals and humans. Original plan was not allow cattle to drink directly from the dam. This arrangement is no longer working.	*Oreochromis esculentus, O. niloticus* and *Clarias gariepinus.*	Most of the fish originated from the Wembere swamp.	Restore the original administration of the dam with proper cattle drinking points. Remove the *Typha* grass growing at the edges of the dam. Fishermen should be trained on fishing methods since fishing is new to them. Reduce cattle grazing in the catchment since this causes siltation to the dam.
"	Kaselya Ponds	A total of 4 ponds; two measuring 16x42m and two measuring 5x42m. The source of water is ground spring water.	*Oreochromis niloticus.*	Fish were taken from Mnyazi Dam which is believed to be predominated by *O. niloticus.*	Encourage Mr. Saidi Ntandu to grow more fish and adopt good dam management practices.

Table 3 – Fish Species Distribution in Singida Region .

	Bahi	L. Singida	L. Kindai	L. Murya	L. Misoghweda	L. Makuro	K. Kijota	Mgori Dam	Sugana	Mianji	Kinku	L. Kitangiri	Sibiti	Ulughu		Total Frequency		% Frequences of occurrence
O esculentus	P	-	-	P	P	-	-	-	-	-	-	P	P	P		6		42.9
O. niloticus	P	P	P	-	-	P	P	-	P	P	P	P	-	P		10		71.4
O amplhimelus	P	-	-	-	-	-	-	-	-	-	-	P	-	-		2		14.3
Clarias gariepinus	P	-	-	-	P	-	-	-	-	P	P	P	-	P		6		42.9
Haplochromis sp.	-	P	-	-	-	-	-	-	-	-	-	-	-	-		1		7.2
Tilapia zilli	-	-	-	P	-	-	-	-	-	-	-	-	-	-		1		7.2
Barbus Paludinosus	-	-	-	P	-	-	-	P	-	-	-	-	-	-		2		14.3
Oreochromis hunteri	-	-	-	-	-	-	-	P	P	-	-	-	-	-		2		14.3
Astatotilapia bloyeti	-	-	-	-	-	-	-	P	-	-	-	-	-	-		1		7.2
Tilapia rendalli	-	-	-	-	-	-	-	P	-	-	-	-	-	-		1		7.2
Protopterus aethiopicus	-	-	-	-	-	-	-	-	-	-	-	P	-	-		1		7.2
Total	4	2	1	3	2	1	1	3	2	2	2	5	1	3				

4. DISCUSSIONS AND RECOMMENDATIONS:

On the average one can rightly say that the fishery of Singida Region is poorly developed. More efforts could be directed to the fishery of Bahi and Wembere Swamps together with Lake Kitangiri. Since Manyoni does not have a fisheries officer, it is difficult to monitor and acquire the fish landing statistics of the Bahi Swamp. It is therefore recommended that a fisheries officer be employed in Manyoni so that he can monitor the fishery of this rich water body. The fishery of Wembere swamp is controlled by unrecorded, unregistered fishers who use all sorts of gears including hoes, spears, nets and even by hand. The Wembere swamps support a very rich fishery especially those of *Clarias, Protoptorus* and tilapias. The mud fishes and lung fishes are usually heavily harvested during the dry season when, even unskilled fishers use simple gears to remove the fish from mud or cocoons.

Earlier records show that Lake Kitangiri used to support a very large fishery. The fish from this lake are supplied to the nearby markets and up to as far as Tabora and Shinyanga Regions. With the poor road linking Lake Kitangiri and Kiomboi and the rest of the country, it is unlikely that the lake fishery resource can reach many parts hence the District Council (Iramba District) will be losing revenue. The situation is particularly worse during the rainy season when no vehicles have access to the lake. It is strongly recommended to construct an all-weather road linking the lake and Kiomboi. Furthermore it is strongly recommended to carry out a scientific survey with a view to assess the production of the lake.

On aquaculture, most parts visited did not show much potential for fish culture due to lack of insufficient water. However, farmers showed great interest in fish farming and therefore should be encouraged to use underground water springs to culture fish.

5. REFERENCES

1. Eccles, D.H. 1992 – Field Guide to the Freshwater Fishes of Tanzania *FAO Species Identification Sheets for Fishery purposes.*

2. Trewavas, E. 1983. Tilapiine Fishes of the genera *Sarotherodon, Oreochromis* and *Danakilia. British Museum (Natural Hostory).*